

**CLAIMS**

1. A variant of a parent Glycoside Hydrolase Family 53 galactanase, comprising an alteration in at least one of the following positions: -6, -4, -2, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 25, 26, 29, 30, 31, 32, 36, 39, 40, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 54a, 54e, 54f, 54g, 54h, 55, 56, 57, 58, 61, 62, 65, 69, 77, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 101, 106, 107, 110, 113, 114, 126, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 144, 145, 146, 147, 150, 153, 157, 159, 163, 169, 171, 172, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 194, 198, 200, 203, 204, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 252, 252d, 252e, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 273, 274, 276, 277, 280, 283, 284, 286, 288, 288a, 289, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 302a, 302d, 302j, 302k, 302m, 302n, 302o, 302q, 302r, 302s, 302t, 302u, 302v, 302x, 302y, 302z, 302aa, 302bb, 302cc, 302dd, 302ee, 302ff, 302gg, 302hh, 302ii, 302jj, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, and 330; wherein

(a) the alteration(s) are independently

- (i) an insertion of an amino acid immediately downstream of the position,
- (ii) a deletion of the amino acid which occupies the position, and/or
- (iii) a substitution of the amino acid which occupies the position;

and

(b) the variant has galactanase activity.

2. The variant of claim 1, wherein the variant comprises at least one of the following substitutions: -6P; -4P; -2P; 1P; 3P; 5A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 8A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 13A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 15A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 16A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 18A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 24C,P; 25P; 26P; 29P; 30C; 31P; 32A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 36A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 39C; 40C; 41P; 43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 46A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

- 47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
51A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 52A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 54A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 54aP; 54eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
54gA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
54hA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
55A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 56A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
58A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
62C; 65C; 69C; 77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
79A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 80A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
81A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 84A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
87A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 88A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
89A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 90A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
91A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 92A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
95A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 96A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
97P; 101P; 106C; 107H,S; 110C; 113C; 114C; 126E;  
131A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
133A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 134A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
135A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
136A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
139A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 140A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
141A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 144P;  
146A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 147P; 150C; 159C; 163C; 169P; 171P;  
172P; 178A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 179A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
180A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
181A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
182A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

- 183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
186A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
188A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
189A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
191A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
194C; 198P; 200P; 203P; 204P; 210A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
215A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 216A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 216FVASTG;  
217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
219A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 221A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
223A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
224A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 226A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
227A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
230A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 231A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
232A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
233A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
234C; 241A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
242A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
245A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

- 247A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
249A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
250A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 252A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
252dA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
252eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
253A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
254A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 255A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
258A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
259A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 260A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
261A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
262A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
264A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 265A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
266P; 273A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 274C;  
276A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
277A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 286P; 288P; 288aP; 289P;  
293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
294A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 297A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
298A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
299A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
301A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 302A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 302dP;  
302jA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

302kA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302mA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302oA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302rA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302tA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 302vA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302aaA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 302bbA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 302ccP;  
302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302eeA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302ffA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302ggA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 302hhA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302iiA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
302jjA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
303A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
304A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 305A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
306A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
307A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 310A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
311A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
312A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
313A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 315A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
316A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
318A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 320A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 321A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 322A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 5 323A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 324P; 325P;  
 326A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 327P; 328C;  
 329A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or 330C.

3. The variant of any one of claims 1-2, wherein the variant comprises at least one of  
 10 the following substitutions: \*-6P; \*-4P; \*-2P; A1P; T3P;

R5A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; G6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; V12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 15 V13A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; V14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,,W,Y;  
 E15A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A18C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 N24C,P; T25P; N26P; A29P; Q30C; L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 20 L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; N39C; G40C; V41P;  
 T43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,,W,Y;  
 25 N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A53C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 \*54aP; \*54eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 \*54gA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 30 \*54hA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 N58A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 35 N62C; I65C; A69C; Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H91A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
5 T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; M94A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
95A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A96C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G97P; D101P; S106C; W107H,S; Y110C; T113C; L114C; Q126E;  
131A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; T144P;  
R146A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; T147P; W150C; S159C; G163C; 169P;  
K172P; H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D184A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
G186A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 W191A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;N194C; Q198P; T200P; L203P; S204P;  
G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F213A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

- S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S219A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
S224A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A225C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
S228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D231A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
M233A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; A234C;  
I241A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A242C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
20 V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
25 P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
I250A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*252dA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*252eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 P253A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
N254A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
R256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
35 S258A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
S261A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;



- D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
K264A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
N265A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; I266P;  
5 Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T274C;  
276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; I277A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
I283A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; S286P; S288P; \*288aP, R289P;  
L293A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
15 A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H302A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 \*302dP; \*302jA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302kA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302mA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302oA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 \*302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302rA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302tA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 \*302vA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302aaA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 \*302bbA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*302ccP;  
\*302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302eeA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302ffA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*302ggA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*302hhA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*302iiA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*302jjA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

5 N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N305A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

G307A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

10 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

15 N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

T314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;

F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

20 Q318A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;

S319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Q321A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;

A322C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

25 L323A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S324P; S325P;

L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S327P; V328C;

F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or Q330C.

4. The variant of any one of claims 1-3, wherein the variant comprises at least one of the following substitutions: G6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; V12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

V13A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; V14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,,W,Y;

35 E15A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

A18C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N24P; T25P; A29P;

L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

- N39C; T43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
5 V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; A53P;  
D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
15 A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H91A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
M94A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; 95A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D101P; W107H,S; Y110C; Q126E; G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
20 E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
25 L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; T147P; W150C; G163C;  
H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D184A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
35 G186A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N194C; Q198P; L203P; S204P;

G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F213A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
10 S219A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
15 S224A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A225C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
S228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
20 S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D231A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
M233A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
25 I241A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A242C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
I250A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
R256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

S258A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 V263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T274C;  
F276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I277A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
10 I283A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; S288P;  
L293A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
15 E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 H302A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N305A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
25 G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
T314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 S317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Q318A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
S319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Q321A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 A322P; S324P; S325P; L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S327P; V328C;  
 F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or Q330C.

5

5. The variant of any one of claims 1-4, wherein the variant comprises at least one of the following substitutions:

- (a) Y214N,S+N247Y+L306Q; Y214A; F216FVASTG ; and/or P89W+W86N;
- (b) A90S+H91D; H91N,L,D; N313D; N303D,H; and/or N305D,H;
- 10 (c) Y22P, N24P, T25P, A29P, A53P, N56P, T93P, D101P, W142P, T147P, Q198P, L203P, S204P, S219P, S258P, S288P, A304P, A311P, Q318P, A322P, S324P, S325P, and/or S327P;
- (d) W107S,H;
- (e) Q126E;
- 15 (f) N39C+L326C; V20C+G320C; Y110C+G163C; W150C+N194C; T274C+V328C; and/or I301C+F316C; and/or
- (g) G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; W9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 20 V12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; V13A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 V14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; E15A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A18C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 25 T43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 30 D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 35 D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H91A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
M94A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
5 E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D184A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
20 G186A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F213A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
30 F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S219A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
35 A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
S224A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

A225C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
S228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
5 S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D231A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
M233A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
10 I241A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A242C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
I250A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
R256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S258A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
25 F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
30 F276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I277A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
I283A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L293A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
35 F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;



P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A299,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 5 H302A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N305A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 10 G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 15 D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 T314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
 F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 20 S317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 Q318A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 S319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Q321A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 25 L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; and/or  
 F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y.

6. The variant of any one of claims 3-5 which is a variant of a *Myceliophthora thermo-*  
*phila* galactanase.

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7. The variant of any one of claims 1-2, wherein the variant comprises at least one of the following substitutions: \*-6P; \*-4P; \*-2P; A1P; Q3P;

K5A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D7A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; W8A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 35 W9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; V12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 M13A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; V14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 E15A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

A18C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N24C,P; V25P; N26P; E29P; K30C;  
L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
39C; G40C; V41P; M43A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
5 V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
10 W53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D54A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; \*54aP;  
\*54eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*54gA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 \*54hA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N58A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N62C; L65C; A69C;  
Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N79A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
20 F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; I85A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
25 A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H91A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
T94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A96C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; G97P; D101P; A106C; W107H,S; Y110C;  
T113C; L114C; Q126E; S131A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
30 G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
35 G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; L144P;

K146A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;W142P; T147P; W150C; S159C; G163C;  
L169P; K172P; H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
N184A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
10 D186A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W191A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; N194C; Q198P; M203P; S204P;  
15 G210A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
F213A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
20 P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 216FVASTG;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A219C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D224A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 S225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
R227A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
R228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
35 L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
N231A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

- M233A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; V234C;  
V241A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
A242C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
5 V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
10 P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
T250A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*252dA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*252eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 P253A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
Y254A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
R256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
20 Q258A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A261C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 V263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
R264A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
N265A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; V266P;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T274C;  
276A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; I277A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; S286P; S288P; \*288aP; K289P;  
L293A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
35 W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H302A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 \*302dP; \*302jA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302kA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302mA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302oA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 \*302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302rA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302tA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 \*302vA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302aaA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 \*302bbA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*302ccP;  
\*302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302eeA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302ffA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302ggA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 \*302hhA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302iiA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302jjA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 N305A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
35 C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

T314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;

F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

5 T317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

P318A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;

S319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Q321A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;

10 A322C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

L323A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S324P; S325P;

L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S327P; V328C;

F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or H330C.

15 8. The variant of claim 7, wherein the variant comprises at least one of the following substitutions: G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

W9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; V12A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

20 M13A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y; V14A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

E15A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

A18C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; V25P; E29P;

L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

25 V41P; M43A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;

V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;

V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

30 P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;

W53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

D54A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

N58A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

35 Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N79A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H91A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
5 T94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; A96C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T113C; G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 T137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; G163C; L169P;  
15 H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
N184A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D186A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
25 Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; Q198P; M203P;  
G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
30 F213A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; 216FVASTG;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
35 S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A219C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

- A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D224A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 S225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
R227A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
R228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
10 L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
N231A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
M233A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
V241A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
15 A242C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
20 N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
25 R256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Q258A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; A261P;  
30 D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
Y276A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
I277A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; S288P;  
L293A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;



Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
5 A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H302A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
10 A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N305A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
15 S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
20 T314A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T317A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
P318A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
25 S319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q321A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; A322P; S324P; S325P;  
L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
F329A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; and/or H330C.

30

9. The variant of claim 8, wherein the variant comprises at least one of the following substitutions:

(a) V20P, V25P, E29P, V41P, V50P, W53P, N56P, T94P, A96P, W142P, L169P, W185P, Q198P, M203P, A219P, A221P, T222P, Q258P, A261P, D262P, S288P, N305P, A311P,  
35 A322P, S324P, and/or S325P;

(b) T113C+G163C, W185C+S229C, S218C+A221C, R227C+V283C; and/or

(c) G6A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;

V7A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;

D8A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W9A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
S10A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
S11A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
5 V12A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
M13A,C,D,E,F,G,H,I,J,K,L,N,P,Q,R,S,T,V,W,Y;  
V14A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
E15A,C,D,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
E16A,C,D,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 A18C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V20A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
Y22A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
L32A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
L36A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
15 M43A,C,D,E,F,G,H,I,J,K,L,N,P,Q,R,S,T,V,W,Y;  
V44A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
R45A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,S,T,V,W,Y;  
Q46A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
R47A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,S,T,V,W,Y;  
20 V48A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
W49A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
V50A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
N51A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
P52A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
25 W53A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
D54A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G55A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N56A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
Y57A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
30 N58A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
Y61A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
Y77A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
N79A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
F80A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 H81A,C,D,E,F,G,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y82A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
S83A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;

- D84A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T85A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
W86A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
A87C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 D88A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P89A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
A90C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H91A,C,D,E,F,G,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
10 T93A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
T94A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
A96,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G133A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
15 E135A,C,D,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T137A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
G139A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L141A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
20 W142A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
H178A,C,D,E,F,G,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N181A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
25 G182A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
N184A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
D186A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 T187A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
Q188A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
G210A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
35 S212A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
F213A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y214A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;

F216A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y217A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
A219C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 S220A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
D224A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 S225A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
R227A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,S,T,V,W,Y;  
R228A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,S,T,V,W,Y;  
S229A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
15 L230A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
N231A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
M233A,C,D,E,F,G,H,I,J,K,L,N,P,Q,R,S,T,V,W,Y;  
V241A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
20 A242C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V243A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
25 N247A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
C252A,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
30 R256A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
Q258A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
F259A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
35 D262A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V263A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
Q273A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
Y276A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;

- I277A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V280A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
 V283A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,W,Y;  
 L293A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
 5 F294A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y295A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W;  
 W296A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
 E297A,C,D,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P298A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
 10 A299C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 W300A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,Y;  
 I301A,C,D,E,F,G,H,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 H302A,C,D,E,F,G,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N303A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
 15 A304C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N305A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
 L306A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y;  
 G307A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S308A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
 20 S309A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
 C310A,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A311C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D312A,C,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N313A,C,D,E,F,G,H,I,J,K,L,M,P,Q,R,S,T,V,W,Y;  
 25 T314A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
 M315A,C,D,E,F,G,H,I,J,K,L,N,P,Q,R,S,T,V,W,Y;  
 F316A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 T317A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,V,W,Y;  
 P318A,C,D,E,F,G,H,I,J,K,L,M,N,Q,R,S,T,V,W,Y;  
 30 S319A,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,T,V,W,Y;  
 G320A,C,D,E,F,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Q321A,C,D,E,F,G,H,I,J,K,L,M,N,P,R,S,T,V,W,Y;  
 L326A,C,D,E,F,G,H,I,J,K,M,N,P,Q,R,S,T,V,W,Y; and/or  
 F329A,C,D,E,G,H,I,J,K,L,M,N,P,Q,R,S,T,V,W,Y.

35

10. The variant of any one of claims 7-9 which is a variant of a *Humicola insolens* galactanase.

11. The variant of any one of claims 1-2, wherein the variant comprises at least one of the following substitutions: \*-6P; \*-4P; \*-2P; A1P; T3P;

R5A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; G6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

A7C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

5 I9A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; L12A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

L13A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L14A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E18A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

10 Y20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

N24C,P; L25P; N26P; T29P; Q30C; A31P; L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; A39C; G40C; I41P;

S43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; I44A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;

R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;

15 R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;

S53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*54aP; \*54eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

20 \*54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*54gA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

\*54hA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; S56A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D58A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

25 Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; N62C; L65C; V69C;

Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

L80A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

L82A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

30 W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;

S90A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D91A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

T94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;

35 S96A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; G97P; D101P; K106C; W107H,S; Y110C;

T113C; L114C; D126E; G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

- I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
5 L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; L144P;  
E146A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T147P; Y150C; S159C; G163C; L169P;  
T171P; T172P; H178A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D181A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
S184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
15 W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D186A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q187A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
20 F191A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T194C; T198P; E200P; S203P; T204P;  
G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
25 Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
30 A219C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
35 A224C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

- K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
T228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
5 A231C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L233A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; Q234C;  
V241A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V242A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
10 V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
15 W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
V250A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*252dA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 \*252eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P253A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
N254A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A256C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
A258C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
S261A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
30 D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L263A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S264A,C,D,E,F,G,H,I,K,L,M,N,P,Q,T,V,W,Y;  
S265A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; I266P;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; Q274C;  
F276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 L277A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L280A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
V283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; A286P; T288P; \*288aP, D289P;  
V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;



Y294A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A299,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G302A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 \*302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302dP; \*302jA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302kA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302mA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 \*302oA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302rA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302tA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 \*302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302vA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 \*302aaA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302bbA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*302ccP;  
\*302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302eeA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302ffA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 \*302ggA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302hhA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302iiA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*302jjA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
35 A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G305A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

5 A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

L314A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;

10 V316A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

D317A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Y318A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

T319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

D320A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

15 E321A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V322A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

Y323A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; E324P; S325P;

I326A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; E327P; T328C;

L329A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; and/or G330C.

20

12. The variant of claim 11, wherein the variant comprises at least one of the following substitutions: T3P; R5A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A7C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; I9A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;

25 S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

L12A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L13A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

L14A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E18A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Y20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

30 N24C,P; L25P; T29P; Q30C; A31P; L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

I44A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;

35 V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; S53P;

D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S56A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; L65C;  
Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L80A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
5 D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
S90A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D91A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
10 T94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
S96P; G133A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; L144P; E146P; T147P; T172P;  
H178A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D181A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
25 S184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D186A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q187A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
30 N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
F191A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
E200P; S203P; G210A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
35 Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;

Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A219C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
5 A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
A224C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
10 L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
T228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
15 A231C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L233A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
V242A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
20 V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
25 P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A256C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
30 A258C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; S261P;  
D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L263A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S264P; I266P;  
35 Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
F276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L277A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L280A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

V283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; T288P;  
 V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 Y294A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 5 W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A299,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 10 I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G302A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G305A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 15 L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 20 A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 L314A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
 25 V316A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 D317A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y318A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 T319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 D320A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 30 E321A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V322A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 Y323A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 E324P; S325P; I326A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; E327P; T328C;  
 L329A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; and/or G330C.

35

13. The variant of claim 12, wherein the variant comprises at least one of the following substitutions:

(a) D181N, D181N+S90A+D91H;

(b) T3P, Y20P, N24P, L25P, T29P, A31P, V50P, S53P, S56P, T93P, T94P, S96P, W142P, L144P, E146P, T147P, T172P, E200P, S203P, A219P, A256P, A258P, S261P, S264P, I266P, T288P, I301P, A304P, Y318P, and/or E324P;

(c) L13C+L65C, N24C+Q30C, S218C+A221C, A304C+Y318C; and/or

- 5 (d) R5A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; G6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A7C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; I9A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; L12A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L13A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L14A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;
- 10 L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E18A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y22A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; L32A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; I44A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;
- 15 Q46A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; V48A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; V50A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N51A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; S56A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; Y57A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;
- 20 Y61A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; Y77A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; L80A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y; L82A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; T85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;
- 25 A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; S90A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D91A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; T93A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; T94A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 30 N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; I136A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; R137A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y; G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 35 L141A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; W142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y; L179A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

D180A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D181A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G182A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W183A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
5 S184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
W185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
D186A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q187A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
Q188A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
10 N189A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G210A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
15 Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
20 A219C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S220A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A221C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
25 A224C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S225A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
K227A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
T228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
30 S229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
A231C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N232A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L233A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
35 V242A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V244A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N247A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
W248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
P249A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
5 C252A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P255A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A256C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y257A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
A258C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
10 F259A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P260A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
D262A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L263A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
15 F276A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L277A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
L280A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
V283A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
20 Y294A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
25 A2990C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G302A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N303A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
30 A304C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G305A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L306A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
35 S309A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
C310A,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A311C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D312A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;



N313A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

L314A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

M315A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;

V316A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

5 D317A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

Y318A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

T319A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;

D320A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V322A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

10 Y323A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

I326A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or

L329A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; and/or

(e) I9F,Y,W; L12V; L80F; L82Y; F191Y,W; Y213F; I9W+L12V; L82Y+L80F.

15 14. The variant of any one of claims 11-13 which is a variant of an *Aspergillus aculeatus* galactanase.

15. The variant of any one of claims 1-2, wherein the variant comprises at least one of the following substitutions: K-6P; S-4P; L-2P; K1P; F3P;

20 K5A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

V9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;

S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; I12A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;

I13A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; A14C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

25 L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; E16A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S18A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; V20A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

F22A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N24C,P; E25P; S26P; K29P; Q30C; D31P;

I32A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; L36A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

A39C; G40C; V41P; Y43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

30 V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

V46A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;

I48A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;

N50A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; D51A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; Y53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

35 D54A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A54aP;

G54eA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

G54gA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

G54hA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
N57A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; D58A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
K61A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; A62C; I65C; A69C;  
L77A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F85A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y; A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
10 A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; K91A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; K93A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
A94C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
K96A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; A97P; N101P; K106C; T107H,S; Y110C;  
T113C; K114C; D126E; Q131A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
15 G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T136A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N137A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
20 G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
A141C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*144P;  
G146A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E147P; W150C; A159C; A163C; \*169P;  
25 S171P; N172P; H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
F179A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T180A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P182A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
30 E183A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S185A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
G186A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
R187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
35 Y188A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
A189C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
I191A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; T194C; H198P; \*200P; H203P; V204P;  
A210C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

S211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 5 P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
 W217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 \*218A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 \*219A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 10 H220A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G221A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 T222A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 K224A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 15 N225A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 T227A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 S228A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 V229A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 20 L230A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 T231A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 S232A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 V233A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; A234C;  
 V241A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 25 M242A,C,D,E,F,G,H,I,K,L,N,P,Q,R,S,T,V,W,Y;  
 V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 A244C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 30 S247A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 Y248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 T249A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 Y250A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 A252C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 35 D252dA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G252eA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 H253A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

G254A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N255A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 T256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 A257C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 5 P258A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 K259A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 N260A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 G261A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Q262A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 10 T263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 L264A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 N265A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 N266P; Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y; A274C;  
 A276C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 15 V277A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 A283C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D286P; G288P; E288aP, A289P;  
 V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 20 Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 25 W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P302A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 V302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 A302dP; N302jA,C,D,E,F,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 30 K302kA,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 L302mA,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 W302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 E302oA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 35 G302rA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 G302tA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 W302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;

- A302vC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 T302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y,  
 S302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 Y302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;
- 5 A302aaC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A302bbC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E302ccP;  
 Y302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 D302eeA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P302ffA,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;
- 10 E302ggA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D302hhA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A302iiC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G302jjA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 K303A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;
- 15 W304A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 F305A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G306A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;
- 20 A309C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V310A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 D311A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 N312A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 Q313A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;
- 25 A314C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 L315A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D317A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 F318A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 30 K319A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 G320A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 R321A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
 P322A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 L323A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; S325P;
- 35 L326A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; H327P; V328C;  
 F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or Q330C.

16. The variant of claim 15, wherein the variant comprises at least one of the following substitutions: K-6P; S-4P; L-2P; K1P; K5A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
G6A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; V9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
5 S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A14C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
S18C;V20P; S26P; K29P; D31P; G40C; Y43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
V46A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
10 I48A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
N50A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; D51A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; Y53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
A54aP; G54eA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W; G54gA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
15 G54hA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; G55A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; N57A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
A62C; A69C; L77A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D79A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F80A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H81A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
20 S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D84A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
F85A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D88A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P89A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
K91A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
25 K93A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; A94C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; A97P; N101P; K106C; K114C;  
Q131A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
G133A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
30 E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T136A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N137A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G139A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
35 A141C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*144P;  
G146A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A159C; A163C; S171P;  
H178A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

F179A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T180A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
P182A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
5 E183A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; S185P;  
R187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y188A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
S211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
10 S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
15 W217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
H220A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G221A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
20 N225A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
T227C; A234C; V241C; V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
A244C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S247A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Y248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
T249A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
Y250C; D252dA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 G252eA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H253A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G254A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N255A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
T256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
35 A257C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P258A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
K259A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;

- N260A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 G261A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Q262A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 T263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 5 L264A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 N265A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 N266P; Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 A276C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V277A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 10 V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; A283C; D286P; E288aP; A289P;  
 V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 15 E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 20 V302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; A302dP;  
 N302jA,C,D,E,F,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 K302ka,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 L302mA,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 W302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 25 E302oA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 Y302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 G302rA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 G302tA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 30 W302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 A302vC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 T302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
 S302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 Y302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 35 A302aaC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A302bbC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; E302ccP;  
 Y302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 D302eeA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;



P302ffA,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
 E302ggA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 D302hhA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 A302iiC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 5 G302jjA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 K303A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
 W304A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 F305A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 G306A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 10 G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 A309C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V310A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
 D311A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 15 N312A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
 Q313A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
 A314C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 L315A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
 F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F318P;  
 20 F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or Q330C.

17. The variant of claim 16, wherein the variant comprises at least one of the following substitutions:

(a) K-6P, S-4P, L-2P, K1P, V20P, S26P, K29P, D31P, A54aP, G54eP, N57P, K93P, A97P,  
 25 N101P, S171P, S185P, T256P, N260P, N266P, D286P, E288aP, A289P, A302dP, S302yP,  
 Y302zP, A302bbP, E302ccP, E302ggP, F305P, D311P, F318P;  
 (b) S18C+Y302qC, G40C+Q330C, V44C+A69C, I48C+A62C, N50C+D84C,  
 G54gC+T302xC, N56C+G302rC, A62C+G146C, K106C+A159C, K114C+A163C,  
 E183C+G221C, T227C+A283C, A234C+V241C, Y250C+Q273C, A302aaC+A302iiC; and/or  
 30 (c) K5A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; G6A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V7A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; D8A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 V9A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; S10A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
 S11A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; A14C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
 L15A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y; Y43A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
 35 V44A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R45A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
 V46A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; R47A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
 I48A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y; W49A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
 N50A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; D51A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

- P52A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; Y53A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G54eA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y54fA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G54gA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G54hA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 5 G55A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; N56A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
N57A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y; L77A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
D79A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F80A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H81A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; Y82A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S83A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y; D84A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 10 F85A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; W86A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A87C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; D88A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P89A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; A90C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
K91A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; Q92A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
K93A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y; A94C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 15 P95A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y; Q131A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
G133A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N134A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
E135A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T136A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;
- 20 N137A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G139A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L140A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
A141C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
\*142A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; \*144P;
- 25 G146A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H178A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
F179A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T180A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
N181A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;
- 30 P182A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
E183A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T184A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
R187A,C,D,E,F,G,H,I,K,L,M,N,P,Q,S,T,V,W,Y;  
Y188A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;
- 35 S211A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
S212A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
Y213A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y214A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

P215A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
F216A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; F216FVASTG;  
W217A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
H220A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 G221A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T222A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
L223A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
N225A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
L226A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 V243A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
A244C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
E245A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T246A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S247A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
15 Y248A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
T249A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y; Y250C;  
D252dA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G252eA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
H253A,C,D,E,F,G,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
20 G254A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
N255A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
T256A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
A257C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P258A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
25 K259A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
N260A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
G261A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Q262A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
T263A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
30 L264A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
N265A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
Q273A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;  
A276C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V277A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
35 V280A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
V293A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;  
F294A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y295A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;

W296A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E297A,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
P298A,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
A299C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
5 W300A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
I301A,C,D,E,F,G,H,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V302aA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y; N302jA,C,D,E,F,H,I,K,L,M,P,Q,R,S,T,V,W,Y;  
K302kA,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
L302mA,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;  
10 W302nA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
E302oA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y302qA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
G302rA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
S302sA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
15 G302tA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
W302uA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
A302vC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
T302xA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,V,W,Y;  
S302yA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
20 Y302zA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
A302aaC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A302bbC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
Y302ddA,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W;  
D302eeA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
25 P302ffA,C,D,E,F,G,H,I,K,L,M,N,Q,R,S,T,V,W,Y;  
E302ggA,C,D,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
D302hhA,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
A302iiC,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G302jjA,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
30 K303A,C,D,E,F,G,H,I,L,M,N,P,Q,R,S,T,V,W,Y;  
W304A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,Y;  
F305A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G306A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
G307A,C,D,E,F,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
35 S308A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,T,V,W,Y;  
A309C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;  
V310A,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,W,Y;

D311A,C,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

N312A,C,D,E,F,G,H,I,K,L,M,P,Q,R,S,T,V,W,Y;

Q313A,C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V,W,Y;

A314C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y;

5 L315A,C,D,E,F,G,H,I,K,M,N,P,Q,R,S,T,V,W,Y;

F316A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y; and/or

F329A,C,D,E,G,H,I,K,L,M,N,P,Q,R,S,T,V,W,Y.

10 18. The variant of any one of claims 15-17 which is a variant of a *Bacillus licheniformis* galactanase.

15 19. The variant of any one of claims 1-18, wherein the number designating each position is the number of the corresponding amino acid residue in SEQ ID NO: 1, said corresponding amino acid residue being derivable from an alignment according to Fig. 5 or 6, said alignment including the parent galactanase.

20 20. The variant of any one of claims 1-19, wherein the parent galactanase has an amino acid sequence which has a degree of identity to the amino acid sequence of SEQ ID NO: 1 of at least 25%.

25 21. The variant of any one of claims 1-20, wherein the parent galactanase is obtained from a strain of *Yersinia*, *Aspergillus*, *Humicola*, *Meripilus*, *Myceliophthora*, or *Thermomyces*., or from a strain of *Bacillus*, *Bifidobacterium*, *Cellvibrio*, *Clostridium*, *Pseudomonas*, *Thermotoga*, or *Xanthomonas*.

22. An isolated nucleic acid sequence comprising a nucleic acid sequence which encodes the galactanase variant of any one of claims 1-21.

30 23. A nucleic acid construct comprising the nucleic acid sequence of claim 22 operably linked to one or more control sequences that direct the production of the galactanase variant in a suitable expression host.

24. A recombinant expression vector comprising the nucleic acid construct of claim 23.

35 25. A recombinant host cell comprising the nucleic acid construct of claim 23 or the vector of claim 24.

26. A method for producing a galactanase variant of any one of claims 1-21, the method comprising (a) cultivating a recombinant host cell of claim 25; and (b) recovering the polypeptide.

5 27. Use of at least one galactanase variant of any one of claims 1-17 in the dairy industry.

28. Use of at least one galactanase variant of any one of claims 1-17 to prepare galacto-oligo-saccharides and/or for hydrolysis of lactose.

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